

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on May 29, 2003. Claim 48 is amended; as a result, claims 33-62 remain pending in this application.

Information Disclosure Statement

Applicant submitted an Information Disclosure Statement and a 1449 Form on February 28, 2002. Applicant respectfully requests that an initialed copy of the 1449 Form be returned to Applicants' Representatives to indicate that the cited references have been considered by the Examiner.

n.t. filed

Drawings Objections

The drawings were objected to regarding "the curvilinear bottom profile and the curvilinear epitaxial film, as required in claims 42-60". (Office Action at page 2). Applicant respectfully traverses this objection and requests the Office to consider the following. Page 2 of Applicant's disclosure states:

In the recess, the more than three monolithic crystallographic surfaces may be referred to as a whole as a substantially curvilinear profile or a curvilinear, segmented-surface profile.

Applicant respectfully asserts that the curvilinear bottom profile and curvilinear epitaxial film are shown. Withdrawal of the objection is respectfully requested.

*No, rephrasing with
an accepted meaning of
curvilinear*

Claim Objections

Claims 40, 41, 48, 49, and 56-60 were objected to because of informalities. Applicant respectfully traverses these objections and requests the Office to consider the following.

Regarding claims 40 and 41, Applicant notes the structure in the cited reference to Nakagawa is significantly different from structures illustrated and claimed by Applicant. A careful review and comparison between Nakagawa and Applicant's illustrations, should clear up the misunderstanding by the Office. Applicant directs the Office to the DETAILED DESCRIPTION OF THE INVENTION section at page 14:

It can be observed that, where first STI 134 is disposed above the plane of the structure depicted in Figure 13A, source 156 and drain 158 are bounded in a first dimension (first

STI 134) by a minimum photolithographic feature structure of length F. Similarly, where second STI 136 is disposed below the plane of the structure depicted in Figure 13A, source 156 and drain 158 are bounded in a second dimension (second STI 136) by a minimum photolithographic feature structure of length F'. Typically, F and F' are substantially the same length.

The language in claims 40 and 41 is correct because the STI structures depicted in FIG. 13B are turned at a right angle (in FIG. 13B) to plane (in FIG. 13A) that exposes the source 156 and drain 158 depicted in FIG. 13A. Consequently, a STI structure bounds the source and the drain.

Withdrawal of the objection is respectfully requested.

Regarding claim 48, first objection, Applicant has amended claim 48 to insert the word --the-- between "wherein substrate". Withdrawal of the objection is respectfully requested.

Regarding claims 48 and 49, Applicant respectfully answers the query of the Office in the negative, whether " 'dimension' be replaced with 'direction'? ". Applicant directs the Office to the DETAILED DESCRIPTION OF THE INVENTION section at page 14 as set forth above. The term "dimension" is used because of the different orientations of the relative structures depicted respectively in FIGs. 13A and 13B. Applicant has provided the two dimensional views that expose cross-section Z-X and Z-Y planes to illustrate embodiments. Withdrawal of the objection is respectfully requested.

Regarding claim 56, language found in the SUMMARY OF THE INVENTION section, page 2, states:

In one embodiment, a vertical transistor is provided that is disposed in a recess that has more than three monolithic crystallographic surfaces. In the recess, the more than three monolithic crystallographic surfaces may be referred to as a whole as a substantially curvilinear profile or a curvilinear, segmented-surface profile.

Thus, the expression

... the recess is covered with a substantially curvilinear bottom profile including epitaxial semiconductive material ...

(claim 56) is understood to include a recess that has more than three monolithic crystallographic surfaces. Withdrawal of the objection is respectfully requested.

§112 Rejection of the Claims

Claims 39, 40, 48-55, and 58 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant respectfully traverses these rejections and requests the Office to consider the following.

Regarding claims 39, 40, 48, and 49, Applicant again directs the Office to the DETAILED DESCRIPTION OF THE INVENTION section at page 14 as set forth above. Applicant respectfully asserts the source and drain are repeatedly described as bounded by an STI structure. A discussion of an STI structure as a minimum feature structure is also in the DETAILED DESCRIPTION OF THE INVENTION section at page 11. Applicant claims a structure that includes a source and drain bounded by an STI structure having a minimum photolithographic feature.

Applicant considers the query by the Office to be misguided. With respect to the first query regarding the limited feature and the state of the art, Applicant claims the STI structure that bounds the source and drain, and as illustrated by way of non-limiting example in FIG. 13B, includes the minimum photolithographic feature in that structure. The second query, "is this the minimum feature that will still provide *isolation* for the devices ..." (Office Action at page 4, emphasis added) belies the Examiner's understanding that the structure is indeed the STI structure. Withdrawal of the rejection is respectfully requested.

Regarding claim 50, a plain reading of the claim indicates that the recess exposes at least a portion of the STI structure. The recess is in the substrate and inherently exposes the substrate. Consequently, the recess exposing the substrate would be set forth immediately following the claim portion, "a recess disposed between the source and the drain". Withdrawal of the rejection is respectfully requested.

Regarding claims 55 and 58, Applicant respectfully disagrees that the term "parallel" cannot accurately describe a direction. Applicant respectfully reminds the Office that a gate is typically an elongated structure (e.g. the electrode 146 with the gate oxide 142, that runs out of the plane of the page in FIG. 13A). Applicant directs the Office to FIG. 13B, which shows two parallel STI structures in cross section. The example of the Office of the Washington Monument and the Jefferson Memorial is inaccurate. They are point structures. Applicant respectfully requests the Office to consider two structures: Constitution Avenue and Independence Avenue in

Washington, D.C. Constitution Avenue "is disposed in a direction parallel to Independence Avenue." They are loosely analogous to the STI structures 134 and 136 (albeit they are depicted in cross section). Withdrawal of the rejections is respectfully requested.

§102 Rejection of the Claims

Claims 33, 34, 36, 37, 38, and 41 were rejected under 35 USC § 102(e) as being anticipated by Nakagawa (U.S. Patent No. 6,239,465).). Applicant respectfully traverses the rejection and requests the Office to consider the following.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." (*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), M.P.E.P. §2131, 8th Ed., Rev. 1).

Claim 33 requires the epitaxial semiconductor film is "localized". The localized nature of the epitaxial semiconductor film is defined in Applicant's disclosure at page 7:

The mobilization of silicon within recess [12], and its redeposition, results in a localized epitaxial semiconductor film 38. The localized nature of epitaxial semiconductor film 38 means that it forms primarily within recess 12.

Nakagawa's epitaxial layer 25 is not "localized". Further, the formation of Nakagawa's trenches 30 and 32 are done subsequent to formation of the epitaxial layer 25, which makes it impossible for Nakagawa's epitaxial layer 25 to be "localized". Because Nakagawa does not anticipate claim 33, withdrawal of the rejections is respectfully requested.

Regarding claim 34, the Office Action incorrectly states Nakagawa's "electrode has an electrode upper surface that is below the substrate upper surface." (Office Action at page 5). Nakagawa's control gate 38 has no upper surface that is below the substrate upper surface.

Applicant notes claims 34, 36-38 depend from claim 33, and Nakagawa therefore also does not anticipate these claims. Withdrawal of the rejections is respectfully requested.

Claims 43, 44, and 46 were rejected under 35 USC § 102(b) as being anticipated by Kato et al. (JP Document No. 356058267). Applicant respectfully traverses the rejection and requests the Office to consider the following.

Claim 43 requires "a recess disposed between the source and the drain" Kato's groove 205 is not disposed between his source 204 and his drain 201. Kato's groove 205 is disposed between two sources 204 on the left, and an unlabeled source on the right of the groove 205. Kato therefore does not anticipate claim 43 and withdrawal of the rejections is respectfully requested.

Regarding claim 44, the Office Action incorrectly states Kato's "electrode has an electrode upper surface that is below the substrate upper surface." (Office Action at page 7). Kato's aluminum gate electrode 207 is entirely above the substrate 201.

Applicant notes claims 44 and 46 depend from claim 43, and Kato therefore also does not anticipate these claims. Withdrawal of the rejections is respectfully requested.

§103 Rejection of the Claims

Claims 39, 40, 61, and 62 were rejected under 35 USC § 103(a) as being unpatentable over Nakagawa. Applicant respectfully traverses the rejection and requests the Office to consider the following.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (M.P.E.P. § 2143 8th Ed., Rev. 1).

Applicant notes as set forth above, Nakagawa does not anticipate claim 33, from which claims 39 and 40 depend. Because all the elements of the independent claim are not taught in Nakagawa, neither are all the elements in the dependent claims. Accordingly, the third criterion establishes there is no prima facie case of obviousness. Withdrawal of the rejections is respectfully requested.

Regarding claims 39 and 40, the Office Action is mistaken about Nakagawa teaching "a vertical transistor, wherein the substrate includes: an N+ doped source and an N+ doped drain disposed on opposite sides of the recess" (Office Action at page 7). Referring the Office to Nakagawa's FIG. 4G, the source 24 (a diffusion layer) and the drain 28 (identified in FIG. 4D, a diffusion layer) are on the same side of the trench 32. Withdrawal of the rejections is respectfully requested.

Regarding claims 61 and 62, the Office admits "Nakagawa does not explicitly teach a memory system coupled to a processor." Claim 61 recites a processor. The Office Action does not cite to a reference that teaches or suggests a processor. Since all the elements of claim 61 are not found in the reference, Applicant assumes that the Examiner is taking official notice of the missing element from an undisclosed source. Applicant respectfully objects to the taking of official notice, and pursuant to M.P.E.P. § 2144.03, the Applicant traverses the assertion of official notice and requests that the Examiner cite a reference that teaches the missing element. If the Examiner cannot cite a reference that teaches the missing element, Applicant respectfully requests that the Examiner provide an affidavit that describes how the missing element is present in the prior art. If the Examiner cannot cite a reference or provide an affidavit, the Applicant requests withdrawal of the rejection and reconsideration and allowance of claim 61. Applicant further notes that obviousness is a question of the subject matter as a whole, and Applicant respectfully asserts claim 61 is unobvious over the cited reference. Withdrawal of the rejections is respectfully requested.

Regarding claim 62, Applicant requests the Office to cite a reference or provide an affidavit. Otherwise, Applicant respectfully requests withdrawal of the rejection.

Claim 47 was rejected under 35 USC § 103(a) as being unpatentable over Kato et al. Applicant respectfully traverses the rejection and requests the Office to consider the following.

The Office Action admits Kato does not teach a doped polysilicon electrode. Where the Office is taking official notice, Applicant requests the Office to cite a reference or provide an affidavit. Otherwise, Applicant respectfully requests withdrawal of the rejection.

Claims 48 and 49 were rejected under 35 USC § 103(a) as being unpatentable over Kato et al. as applied to claim 47 above, and further in view of Min (U.S. Patent No. 6,476,444). Applicant respectfully traverses the rejection and requests the Office to consider the following.

The Office Action is mistaken regarding the structure in Kato. Kato's groove 205 is not disposed between his source 204 and his drain 201. Kato's groove 205 is disposed between two sources 204 on the left, and an unlabeled source on the right of the groove 205. The Office Action attempts to construct Kato's source and drain to be on opposite sides of the recess, but contradicts this assertion by stating "(top and bottom)". The Office Action next appeals to Min to remedy no teaching in Kato's failure to teach STI structures. (Office Action at page 10). But neither Min nor Kato singly or in combination teach or suggest the limitation in claim 43, from which claims 48 and 49 depend, of "a recess disposed between the source and the drain, wherein the recess comprises a substantially curvilinear bottom profile of epitaxial semiconductive material" (claim 43). Applicant respectfully asserts therefore the Office has used the Applicant's disclosure as a guide to combine references. Applicant respectfully asserts that no prima facie case of obviousness has been established. Withdrawal of the rejections is respectfully requested.

Regarding the minimum photolithographic feature limitation of the claims, Applicant requests the Office to cite a reference or provide an affidavit. Otherwise, Applicant respectfully requests withdrawal of the rejection.

Claims 50-55 were rejected under 35 USC § 103(a) as being unpatentable over Kato et al. in view of Min. Applicant respectfully traverses the rejection and requests the Office to consider the following.

The deficiencies of Kato and Min, singly or when combined, are set forth above and are incorporated herein by reference. The Office Action admits "Kato does not teach a monocrystalline substrate." (Office Action at page 11). The assertion by the Office that "[m]onocrystalline substrates are a well known substrate material etc." (ibid). is not in dispute. Applicant respectfully asserts the subject matter as a whole is not taught or suggested by the cited references. Withdrawal of the rejections is respectfully requested.

Regarding claims 51-54, Applicant notes that the claim language calls out structure that is neither taught nor suggested in Kato or Min, either alone or in combination. Because all the

claims limitations are not taught or suggested, withdrawal of the rejections is respectfully requested.

Regarding claims 56-60, Applicant notes that no art rejection of these claims is provided in the Office Action, although claim 58 was rejected under 35 U.S.C. § 112 ¶2 as set forth above. Applicant respectfully asserts that the cited references, either alone or in combination, fail to teach or suggest the limitations of claims 56-60. Applicant earnestly requests a notice of allowability of these claims, along with claims 33-55 and 61-62.

Allowable Subject Matter

Claims 35, 42, and were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant respectfully asserts the patentability of claims 35, 42, and 45 has been established over the cited references, without the necessity of amending them to include the limitations of their respective base and any intervening claims.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, John Greaves, at (801) 278-9171 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743


Respectfully submitted,

FERNANDO GONZALEZ

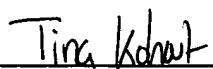
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